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A Physiologic Study of the Anxiety and Apprehension of Children in the Dental Situation

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By

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AUTOBIOGRAPHY

Wayne E. Milos was born in Chicago, Illinois on October 8, 1944. After graduating from St. Ignatius High School in 1961, he attended Xavier University in Cincinnati, Ohio. After completing college, a dental career was pursued at Loyola University School of Dentistry from 1965 to 1969. In June, 1969, he received the degree of Doctor of Dental Surgery. Since that time, Dr. Milos has been a post-graduate student in the Pedodontic Department of Loyola Dental School and has been enrolled in the Department of Oral Biology of the Loyola Graduate School working toward a Master of Science degree in Oral Biology.

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DEDICATION

I dedicate this thesis to my wife Janet for her lasting patience and great sacrifices made in order to further my education.

TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

Children should be seen and preventive dental procedures should be instituted as early as age two and a half. The majority of dentists fear that they will produce psychic trauma in the pre-school child. As a consequence, early dental care is often avoided until a later age. Frequently, by that time, irreparable damage to the dentition has already occurred.

The dentist who is not in tune with the young child's capabilities to withstand stress is not therefore comfortable while treating him. The literature reveals a paucity of experimental studies designed to provide the dentist with information about stress and the child in the dental situation.

There have been many subjective studies concerning patient reactions to dental situations and much speculation as to the anxiety or fear of the patient. Such studies are those of Jenks (1944), McDonald (1961), Teuscher (1961), Olsen (1965), and Croxton (1969), as well as many others. These studies are helpful in that they open the way for discussion and make more obvious these problems, however,

most of the literature has been empirical and subjective in character and the individual bias of the investigator frequently distorts the results. Objectivity, experimental design, adequate controls, and accurate means of measurement are necessary to give a more significant view of what could be called psychologically the "internal milieu" - that is, the internal reactions to the external dental situation.

The problem of this study, therefore, is to gain some measure of the "internal milieu" at a young child's first dental visit. A few studies; Howitt and Stricker (1963, 1965), Lewis and Law (1958), Roder, Lewis, and Law (1961), have utilized the measurements of physiologic responses in other dental situations and at other ages. Other studies have used the same method for evaluating response to medical and surgical treatment. This study will use the same general technic in what could be described as a psycho-physiologic manner.

The purpose of this study is to try to add scientific experimental knowledge about the young child's first dental visit. To restate the purpose more specifically - to enhance the understanding of the internal and external manifestations of the behavior of the child in a typical dental situation.

An objective view of the child's reactions will add to the research which has been conducted covering anxiety in children.

CHAPTER II

REVIEW OF THE LITERATURE

A. Introductory Remarks

Although studies concerning the behavior of children in the dental situation are of great interest to practicing dentists, research in the area is very scarce. McDonald (1961) has commented on the need for expanded clinical research. Olsen (1959), in his review of pedodontic research, showed that no comprehensive studies were in progress in this field. Since 1958, some objective research has been done concerning patient reactions to the dental situation, but more research is necessary to aid the practicing dentist in his approach to the child patient.

B. Review of Early Research

Probably the first pertinent study of child management in the dental office was undertaken by Juliet Ober Bell. In her report, Bell (1943), a psychologist, outlined the dental procedures that were employed in a typical office situation and recorded the overt reactions of each child and of the dentist to these procedures, citing the actual words used by the child and the dentist. She did

not, however, attempt to formulate a standard technic for securing proper rapport with any child.

Bell's work correlated closely with some of the previous investigators. Jersild (1935) found in his study that there was little difference between the sexes in average frequency of fear shown by boys and girls in response to pain. The nervous, apprehensive behavior in the dental stiuation seemed to be a counterpart of this fear shown.

With some of the studies, psychologists did attempt objective research concerning emotions manifested by physiologic changes. Jones (1935) started research with the galvanic skin response as related to overt emotional expression and in a later work, designed the experimental method for recording the galvanic skin response to evaluate emotional change.

Jones (1935) reported galvanic skin response changes for 80 children. These children independently were exposed to anxiety causing stimuli such as doorbells, unexpected sounds, and the presence of a rat in a cage. The galvanic skin response was recorded and children were observed for their reactions. His conclusions were that situations which on the average elicit strong overt responses also on the average elicit marked changes in skin conductance. For

these children, there were wide individual differences and the intensity of the outward reaction provided a poor index of autonomic responses as recorded by a galvanic skin response.

Other researchers, Landis (1932), Shock (1936), and Lacey (1952) continued research with the galvanic skin response and established it as a means of monitoring emotional change.

Carmichael (1941) established through his study that a 2500 ohm change in resistance was indicative of anxiety in people accustomed to a set of stimuli.

C. Review of Psychologic Research

Emotion is an extremely complex phenomenon. According to Lindsley (1951), emotion involves the human organism at many levels of neural and clinical integration, all of the facets being diffuse and intermingled. Jersild (1947) described emotion as involving an experience of feeling. Such feelings are commonly described as love, fear, anger, and jealously. According to Ryan (1946), a pre-school child who has not been pre-conditioned may be "mildly anxious" or exhibit emotion in the dental environment.

As early as 1885, Angelo Mosso, an Italian psychologist, recorded many studies of fear and its influence on the heart and respiration. He was able to demonstrate periodic undulations in man's blood pressure caused by the respiration cycle, and he opened new doors with his studies of the circulation of the blood in the brain and its association with fear. He not only performed many carefully controlled experiments on blood pressure and pulse in emotion, but his observation of pallor and blushing, of respiration, of trembling, of facial expression, and of maladies produced by fear are all of unusual significance to research in emotion.

Whitehorn et al. (1935) confirmed the belief that heart rate may be markedly accelerated during an emotional experience. Loftus (1945) and his coworkers noted a positive correlation between changes in electrocardiograms and emotional states. They found that anxiety seemed to be the only emotion which was persistently present when a change in the electrocardiogram occurred.

Darrow (1943) in his research with physiologic tests of autonomic function and autonomic balance, considered rapid heart rate as indicative of a state of anxiety or fear.

Guyton (1965), in a review of the cardio-vascular system in his textbook, states that there is an increase in

heart rate when a person is subjected to a stressful situation.

The average pulse rate as reported by Nelson (1969) for three year old children is 105 with a range from 80 to 125. The average pulse rate for four year old children is 100 with a range from 80 to 120. These average figures, as reported in the literature, are important when considering the analysis of levels of anxiety of children in this current study.

D. Review of Dental Research

It was not until the late 1950's that scientific quantitative evaluations of the dentist-child relationship were begun. These scientific evaluations utilized physiologic monitors.

Lewis and Law (1958) evaluated the psychophysiologic reactions of eighteen children between the ages of five and one-half and seven. These patients had previous dental experience and had presented no particular management problems during treatment. The children's reactions to the presence or absence of the parent from the operating room during a dental appointment involving oral prophylaxis was evaluated. In this study, three psychophysiologic responses were

simultaneously recorded. They were the galvanic skin response, face and hand temperature, and the heart rate. A polygraph machine was utilized as the recording apparatus. Other equipment utilized was a Hammercraft converter unit consisting of a main chassis, two multiconductor cables, a subject terminal box located at the base of the dental chair, and a set of electrodes and transducers. Temperature transducers consisting of small thermistors were used as well as sterling silver electrodes for recording the galvanic skin response. The leads for the EKG were thin sterling silver plate electrodes and a small clip electrode for attachment to the ear lobe.

The attachment and position of the electrodes in this first study were as follows. The EKG leads were attached to the right ankle, left wrist, and left ear lobe. The galvanic skin response electrodes were attached by tape to the first and second fingers of the left hand. A finger thermistor was attached to a finger of the left hand with the face thermistor taped to the left cheek.

The results showed practically no significant differences in the psychophysiologic reactions of the children of this age with previous dental experience regardless of whether or not the parent was present in the operating

room. From this first work, a polygraph technic was devised for practical study of children's emotion in dental situations.

Roder, Lewis, and Law (1961) evaluated the dentist's reaction to the presence or absence of a parent in the dental operatory. Most of 910 dentists surveyed preferred that the mother of the child-patient be absent from the operatory. In their experimental studies, the dentist's EKG was monitored and from this the dentist's reaction in terms of heart rate was determined.

The EKG was recorded through a graph preamplifier which had been modified by reducing the band width. With this modification, movement artifacts were reduced considerably. The heart leads were placed under the gown of the dentist on either side of the heart, approximately three and one-half inches apart. With this experimental technique, easily analyzable results were obtained.

The results showed that there was no significant difference in heart rate responses of the dentist to the two clinical situations of parent present or absent from the dental operatory. The dentists, however, did show significant differences in heart rates during different dental treatment procedures.

Howitt and Stricker (1965) in a study of 88 children, ranging in age from four years to seven years nine months, evaluated their physiologic changes during simulated dental appointments. Some of the children had previous dental experience while others had no experience. A modified Stoelting polygraph was utilized to record the galvanic skin response by means of a galvanometer and cardiac rate and peripheral blood flow by means of a photoelectric plethysmograph. In their report, only the cardiac rate was considered with no correlation or evaluation of the galvanic skin response. The electrodes and plethysmograph were attached to three fingertips utilizing light pressure.

Previous to the physiologic monitoring in the dental situation, these children were tested by means of the Columbia Mental Maturity scale and the Children's Manifest Anxiety test to obtain scores for intelligence and anxiety. Some of the children received the dental examination while others acted as a control group and were not examined. The examination consisted of a mirror and explorer exam.

The results of the study showed that the children in the control group with low anxiety scores had higher cardiac rates than those with high scores. Those children

given the examination who had low anxiety levels also had low cardiac rates. In this same group of examined children, those with high anxiety levels had high cardiac rates. The investigators concluded that highly anxious children will not profit from ordinary techniques of reassurance and explanation. It appeared less anxious children may benefit from such techniques. They also showed a significant difference in mean cardiac rate between the clinically observed anxious and non-anxious patient groups. This, they state, clearly indicates a relationship between the clinical judgement of apprehension and the physiologic recording of cardiac rate. They also state that knowledge of cardiac rate would aid the observer further in his ability to clinically rate the child's apprehension.

With a physiologic recording technique established, this present study will utilize a similar recording technique in order to gain some measure of the "internal milieu" at a young child's first dental visit.

CHAPTER III

METHODS AND MATERIALS

A. Selection of Patients

This study evaluated a random sample of twenty-five children of three and four years of age drawn from children who came to the dental school for treatment. None of the children had ever been to a dentist. After the parent gave his permission, a dental visit was set up for the child.

B. Experimental Method

All dental visits took place in the morning. The child waited with the parent in a waiting room with other patients and parents and was then separated from the parent and brought to the dental examination room by the wiring technician. Once in the dental examination room, the child was seated in a lounge type, pedodontic, dental chair and his right arm was placed on the arm rest with the fingers extended and palm flat against the arm rest. The leads were described to the child as wires to tell how he was feeling, and he was told that after they were on his fingers, he should not move his fingers or hand since that would shake the wires.

The dental examination room in which the study took place was a closed dental operatory with a one way glass window along one of the walls. On the other side of the one way glass window was a second operatory which housed a polygraph and positions for two observers who were isolated from each other as well as from the polygraph. The observers for the study were a pedodontist and a dental hygienist, each with considerable experience in working with children.

C. Observational Ratings

These observers rated the child as to their overall reaction to the dental situation as well as to their acceptance of the dental examination by the examiner. The observers rated the child's reaction according to a five point rating scale. This rating scale is a modification of the rating scale devised by Frankl, Shiere, and Fogels in 1962. The rating scale was as follows:

Rating 1 - Good rapport with the dentist, interested in the dental and monitoring procedures, laughing and enjoying the situation.

Rating 2 - Acceptance of treatment; at times cautious, willingness to comply with the dentist, at times with reservation, but patient follows the dentist's directions co-operatively.

Rating 3 - Either acceptance or rejection of treatment at various times, at times following directions and at other times rejecting them. Overall 50% acceptance of situation and dentist, as well as 50% rejection of situation and dentist.

Rating 4 - Reluctant to accept treatment, uncooperative, some evidence of a negative attitude but not pronounced, i.e. - sullen, withdrawn.

Rating 5 - Refusal of treatment, crying forcefully, fearful, or any other overt evidence of extreme negativism.

Each child was rated twice by each observer.

Rating A - The rating for child's total overall reaction to the dental environment, situation, electrode wiring, wiring technician, etc.

Rating B - The rating of the child to the dentist and mouth mirror and explorer examination of the teeth. This rating encompasses the time in which the dentist enters the operatory and does the examination until the dentist leaves the operatory.

These observational ratings were then correlated with the recorded physiologic data. A technician did the physiologic recording and marked all pertinent data.

D. Personnel

In total, the personnel who took part in the study were the two observers, the technician for the polygraph recording apparatus, a wiring technician, and the female pedodontist who examined the child's teeth. The wiring technician was the person who brought the child to the examining room and wired him with the plate electrodes.

After the child was wired with the recording monitors by the wiring technician, the technician left the

room giving the child the explanation that he had to take care of other children in the dental clinic.

E. Experimental Recording Procedure

The recordings were started at this point and any adjustment in monitors was done in order to get readable base and control recordings on the recording paper. A base-line was established where the recording was readable and not fluctuating markedly. When a good base-line was established, the time varying from patient to patient, the female pedodontist entered the room and went through a prepared standardized presentation to the patient. She performed a mouth mirror and explorer examination of the child's teeth. At this time, the pedodontist depressed a pedal which caused an event marker pen to mark the physiologic recording. When she finished talking to the child praising him for his assistance, she again depressed the pedal and left the examination room. Following the stabilization of the polygraph record, the patient was dismissed from the examination room and brought to the parent.

In previous studies, dental stress in children was measured by means of various physiologic monitors. The monitors used in this study were the pulse rate and the

galvanic skin response. These monitors were chosen over others because they were: 1) quite easy to utilize with young children, 2) very stable during child movement, and 3) easy to operate.

The equipment for recording galvanic skin response consisted of two plate electrodes which were taped with adhesive tape utilizing light pressure to the ventral and dorsal sides of the finger. The pulse rate was recorded by means of a photoelectric plethysmograph. The pulse sensing element was placed against the ventral surface of a second finger and in light pressure with the skin.

The photoelectric pulse pickup is a plethysmographic transducer which detects and records on the polygraph the cardio-vascular pulse pressure wave. It requires direct attachment to any vascular area such as the finger. The transducer connects directly to the polygraph. The pulse-sensing element consists of a photo-conductor and a light source mounted side by side. The light source transilluminates the area to which it is applied, and the photoconductor detects changes in light intensity within the tissues caused by pulsatile variations in blood volume. This change in the amount of light reaching the photo-cell causes a change in

electrical output which then is amplified and transformed into a mechanical force to operate a pen which records peripheral blood flow and cardiac rate.

The galvanic skin response records information concerning skin resistance and the variations resulting from reaction of the autonomic nervous system to internal and external stimuli. The skin response was obtained by measuring the resistance between two electrodes applied to the skin of the subject. A constant D.C. current of 20 microamperes is passed through the electrodes, and the voltage across the electrodes is then amplified and recorded on the polygraph. With the current held constant, the voltage across the electrodes is directly proportional to the resistance between the electrodes. The sensitivity is able to be increased to a maximum of approximately 300 ohms per centimeter of recording pen deflection with skin resistance up to 1,000,000 ohms.

The output of the galvanic skin response preamplifier recording equipment was recorded as a direct-coupled signal. With this coupling, the skin resistance of the subject may be balanced out and read directly on the calibrated dial. These data were then written on the polygraph recording for later computation of changes in resistance.

The photoelectric plethysmograph was recorded on one of the channels of the polygraph and the galvanic skin response on a second channel. Another channel operated by a simple on-off switch was used to mark start, finish, and other events so that they could be correlated in time with the cardiac rate recordings. This third channel also was utilized as a time marker.

F. Recording Equipment

Physiologic recording equipment utilized in this study was manufactured by E. and M. Instrument Company in Houston, Texas. Physiograph Four-A, a four channel polygraph was utilized throughout the study with only three channels operating. The leads used were the photoelectric pulse pickup, part no. 91-500-700, the galvanic skin response preamplifier, part no. 93-700-70, and the galvanic skin response electrode kit as the leads.

CHAPTER IV

EXPERIMENTAL RESULTS

The study of a random sample of twenty-five children at their first dental visit produced the following observational and physiologic results.

A. Observational Data

Each child was rated as to his reaction to this dental visit. The child was rated on the five point rating scale previously described. Individual ratings obtained for each patient by the two observers are tabulated in Table 4.

B. Physiologic Data (Table 5)

1. Pulse Rate

   Pulse rate was monitored for the twenty-five subjects. The child's pulse rate was computed for three periods:

   a. Rate before dentist entered operatory

   b. Rate on dentist entering

   c. Rate during examination

   The means and standard deviations for pulse rates for these periods are given in Table 1.

Paired t-tests were computed for pulse rate differences. (Table 2)

a. before-entering

b. before-examination

The pulse rate change from before the dentist entered to entering showed a statistically significant increase at P = .05.

The pulse rate increase from before the dentist entered to the examination was not statistically significant at P = .05.

2. Galvanic Skin Response (Table 6)

Galvanic skin response was monitored for the twenty-five subjects. The child's skin response was calculated for three periods.

a. skin resistance in ohms before dentist entered operatory

b. skin resistance in ohms on dentist entering

c. skin resistance in ohms during examination

The mean and standard deviation for the galvanic skin response are outlined in Table 1.

Paired t-tests were calculated for changes in galvanic skin response. (Table 2)

a. before-entering

b. before-examination

The GSR change from before the dentist entered to entering showed a statistically significant decrease at P = .05.

The GSR change from before the dentist entered to the examination showed a statistically significant decrease at P = .05.

C. Correlation

A Spearman's Ranked Correlation Test was calculated in order to correlate the ranked observational data with the following parameters.

1. Pulse rate during examination
2. Pulse rate change from before to examination
3. GSR during examination
4. GSR change from before to examination

A Correlation Test was also calculated for the pulse change from before to during the examination to the GSR change from before to during the examination. Results of the Correlations are outlined in Table 3.

TABLE 1

MEANS AND STANDARD DEVIATIONS

Pulse Rates

	Mean	Standard Deviation
Before	114	19
Entering	117	17
During Exam	115	20

Galvanic Skin Responses (Ohms)

	Mean	Standard Deviation
Before	124,924	100,081
Entering	106,684	96,521
During Exam	97,060	89,378

TABLE 2

T-TEST COMPARISONS

Pulse	t value
Comparison of before to entering	2.32*
Comparison of before to examination	.62

Galvanic Skin Response	t value
Comparison of before to entering	6.11*
Comparison of before to examination	4.02*

* Statistically significant at the P = .05

TABLE 3

CORRELATION OF OBSERVERS TO PARAMETERS

Spearman's Ranked Correlation Test

Correlation of Rankings	R value
Observers to pulse during exam	.19
Observers to pulse change	.04
Observers to GSR at exam	-.13
Observers to GSR change from before to exam	-.12
Pulse change during exam to GSR change during exam	.28

TABLE 4

OBSERVATIONAL DATA

Patient No.	Ratings by Observers			
	Overall Rating		Rating for Dental Exam	
	Obs. 1	Obs. 2	Obs. 1	Obs. 2
1	2	2	2	2
2	3	4.5	4	5
3	2	2	3	3.5
4	2	2	2	1.5
5	2	2.5	2	2
6	2	2	2	2
7	2	2	2	2
8	1	2	2	2
9	2	1.5	2	2
10	2	1.5	2	2
11	2	1.5	2	2
12	2	3	2	2.5
13	2	1.5	2	1.5
14	2	1.5	1	1.5
15	2	1.5	2	1.5
16	2	1.5	3	2.5
17	2	1.5	2	1.5
18	2	1.5	2	2
19	2	2	2	2
20	1	1	1	1
21	3	2	3	2.5
22	2	1.5	2	2
23	2	3.5	2	3
24	2	2	2	2
25	2	3	2	3

TABLE 5

PULSE RATE

Patient No.	Pulse Rates Per Minute		
	Before	Entering	During Exam
1	116	124	116
2	126	132	126
3	124	130	168
4	124	120	124
5	100	124	104
6	116	112	120
7	112	112	100
8	96	108	108
9	92	92	100
10	104	100	92
11	128	144	136
12	96	96	96
13	116	116	104
14	132	140	140
15	104	100	104
16	100	100	96
17	92	96	96
18	152	144	128
19	96	100	96
20	116	116	116
21	100	108	108
22	100	114	104
23	136	136	124
24	112	112	104
25	164	152	156

TABLE 6

GALVANIC SKIN RESPONSE

Patient No.	Galvanic Skin Response (ohms)				
	Before	Entering	During Exam	Diff. of Before to Exam	% Change
1	146,000	119,000	87,200	58,800	40
2	99,300	96,000	96,000	3,300	3
3	53,000	36,000	36,000	17,000	32
4	417,000	412,000	397,000	20,000	5
5	83,000	68,000	68,000	15,000	18
6	85,000	77,000	77,000	8,000	9
7	264,500	247,000	205,000	59,500	23
8	58,000	43,000	39,900	18,100	31
9	86,700	73,400	73,400	13,300	15
10	46,000	29,000	16,000	30,000	65
11	280,000	240,000	124,000	156,000	56
12	76,000	54,000	59,000	17,000	22
13	50,000	30,000	33,300	16,700	33
14	79,200	63,200	63,200	16,000	20
15	105,000	83,000	77,000	28,000	27
16	160,000	145,000	145,000	15,000	9
17	205,000	131,000	101,000	104,000	51
18	68,400	66,500	66,500	1,900	3
19	329,000	304,000	310,000	19,000	6
20	150,000	120,000	140,000	10,000	6
21	93,000	68,000	62,000	31,000	33
22	28,000	18,000	18,000	10,000	36
23	40,000	39,000	35,000	5,000	13
24	50,000	39,000	35,000	15,000	38
25	71,000	66,000	62,000	9,000	13

TABLE 7

RANKING OF TOTAL DATA

Patient No.	Combination of Obs. Ranking	Pulse Rates		GSR	
		At Exam	Change	At Exam	Change
1	6	10.5	14	9	4
2	1	6	14	8	24
3	2	1	1	20	11.5
4	21.5	7.5	14	1	8
5	13.5	16	8.5	13	16
6	13.5	9	8.5	10.5	22
7	13.5	19.5	18	3	3
8	13.5	12.5	2	19	10
9	13.5	17.5	4	12	18
10	13.5	25	23	25	6
11	13.5	4	4	6	1
12	8	22.5	14	18	11.5
13	21.5	16	23	23	13
14	24	3	4	15	14
15	21.5	16	14	10.5	7
16	3.5	22.5	19	14	16
17	21.5	22.5	8.5	7	2
18	13.5	5	25	14	25
19	13.5	22.5	14	2	9
20	25	10.5	14	5	19.5
21	3.5	12.5	6	16.5	5
22	13.5	16	8.5	24	19.5
23	6	7.5	23	21.5	23
24	13.5	16	20.5	21.5	16
25	6	2	20.5	16.5	21

CHAPTER V

DISCUSSION

The results of this study show that there were increases in pulse rate when the dentist entered the operatory as well as during the examination. In data on sixteen children, the dentist appeared to have a calming effect by reducing pulse rate. The initial pulse rate of these children did increase on entrance of the dentist, but her talking with the children did decrease the pulse rates below that initial rate. This decrease in pulse rate might be attributable to the calming effect of the dentist, the child adapting to his environment, or merely the need of the child to have contact with some person instead of sitting alone in the dental chair.

In reviewing pulse rates of all children in the study, they seemed to fall into one of four categories:

1. Those children who were apprehensive before treatment with increase in pulse rate and who showed a further increase in rate during the examination.

2. Those children who were calm and had very little or no pulse change before treatment - with the exam and contact with the dentist, there was a further decrease in pulse rate.

3. Those children who were calm and had low pulse rates at the beginning but increases throughout the dental visit.

4. Those children who were very apprehensive with high pulse rates at the beginning and had a progressive decrease throughout the dental visit.

From these categories, it appeared that the dentist had a calming effect on the less anxious children, but was unable to help in allaying the anxiety of the very anxious patients. These observations agree with results obtained by Howitt and Stricker (1965) in their study. They speculated that highly anxious children will not profit from ordinary technics of reassurance and explanation, while less anxious children may benefit from such technics.

The observers did detect a marked increase in anxiety in one child which correlated well with a marked increase in pulse rate. In the same child there was a thirty-two per cent decrease in the galvanic skin response, but many children showed a greater magnitude of change. In the results of the other children, the observers did not detect increases or decreases in anxiety which correlated with change in pulse rate. This is in contradiction to other authors who felt that the pedodontist should be able to observe changes.

The galvanic skin response did not follow any patterns and there were no unusual single patient data that

might be commented upon. The observers saw no anxiety change in some of those children with either greatest or least percentage of change.

In previous research, many conclusions were drawn from data which might not have truly substantiated them. Lewis and Law (1961) concluded that the presence or absence of the parent in the operatory with the child and dentist did not effect the reactions of the child. Their study was done with older, well trained, experienced patients and to conclude anything more than that would be incorrect. I feel that a similar study with younger children, without experience, would be a more valid study of the problem of the child's anxiety reaction to presence or absence of the parent.

The observational data from the present study were similar to data obtained by Howitt and Stricker (1965). Eighty-four per cent of the patients in their study were considered non-apprehensive. This study confirms their findings in that the majority of patients in the present study demonstrated low observational ratings indicative of very low apprehension. This evidence suggests that the majority of children are not very apprehensive about dental visits but might become apprehensive in reaction to the

dentist or dental techniques. Further research is necessary concerning the etiology of this apprehension.

I feel that both a more refined technique for the study of internal manifestations of anxiety and a more quantitative observational method are still needed to add more accurate scientific information. The utilization of more highly trained individuals more capable of observing the reactions of children might also add to the present study.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Summary

The need to understand the child's reactions to his first dental visit is important in the total treatment of that child. If we can establish an objective method of recognizing his anxiety early, his treatment would be greatly enhanced. This study was conducted to learn more about the child's reactions at his first dental visit.

Twenty-five randomly selected three and four year old patients were observed during their first dental visit and rated as to their external reactions to the dental situation. The children were observed while they were alone in the dental operatory, on entrance of the dentist, and during a dental examination. The patients received observational ratings to their overall reactions as well as their reaction to the oral examination. The children's internal reactions were also monitored by a polygraph throughout the complete dental visit. The monitors used were the pulse rate and the galvanic skin response.

The results showed an increase in pulse rate and a decrease in the galvanic skin response. These results

agree with results from previous investigators. No statistically significant correlation between the observational data and the physiologic recordings were obtained. The observers were only able to detect changes in children's external reactions when there were gross internal physiologic changes.

The results of this study did show that there were increases in pulse rate when the dentist entered the operatory as well as during the examination. In some patients, the dentist appeared to have a calming effect however. It appeared that the dentist had a calming effect on the less anxious children, but was unable to help in allaying the anxiety of the very anxious patients.

Conclusions

1. There was no statistically significant correlation between observers recordings and apprehension as evaluated by pulse rate and galvanic skin response.
2. There was a statistically significant increase in pulse rate as the examiner entered the examination room.
3. There was an increase in pulse rate in child's reaction to the examination but it was not statistically significant.

4. There were statistically significant changes in galvanic skin response on examiner entering examination room and also for the child's reaction to the examination.

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APPROVAL SHEET

The thesis submitted by Dr. Wayne E. Milos has been read and approved by members of the Department of Oral Biology.

The final copies have been examined by the co-directors of the thesis and the signatures which appear below verify the fact that any necessary changes have been incorporated, and that the thesis is now given final approval with reference to content, form, and mechanical accuracy.

The thesis is therefore accepted in partial fulfillment of the requirements for the Degree of Master of Science.

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